



# **SANTA CLARA FIRE DEPARTMENT COMMUNITY RISK REDUCTION DIVISION**

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## **FIRE DEPARTMENT EMERGENCY APPARATUS ACCESS**

*This standard is a summary of City and State codes and standards. Information contained herein applies to typical circumstances and may not address all situations. This document is continually updated, so ensure to use the most recent edition.*

### **PURPOSE**

This standard is intended to provide detailed instruction for emergency vehicles and personnel to buildings, structures, complexes, subdivisions, or other developments required by the California Fire Code and City of Santa Clara Fire Department Standards.

### **DEFINITIONS**

**Emergency Escape and Rescue Window:** An operable window that provides a means of escape and access for rescue in an emergency.

**Emergency Vehicle Access Easement (EVAE):** An emergency access easement conveys the right of ingress and egress to be used for fire protection and emergency services. Required easements are required to “be recorded” with Santa Clara County.

**Fire Apparatus Access Roads:** The means for emergency apparatus to access a facility or structure for emergency purposes. Roadways must extend to within 150 feet of all portions of the exterior of the first floor of any structure and must meet specified criteria for width, pavement characteristics, roadway gradient, turning radius, etc. Extenuating circumstances increased hazards, and additional fire safety features may affect these requirements. Fire apparatus access roads are also referred to as fire lanes or EVAEs.

**Fire Lane Identification:** Fire lane identification will be required when it is necessary to restrict vehicles' parking to maintain the required width of fire access roadways for emergency vehicle use. The local law enforcement agency will enforce unlawful use of fire lanes per the California Vehicle Code.

**Hose Pull:** The effective distance (150 feet is standard) firefighters can drag a hose from the fire apparatus to attack a fire. Hose pull is measured along a simulated path of travel, accounting for obstructions and not a straight line. The Fire Department always determines the starting point.

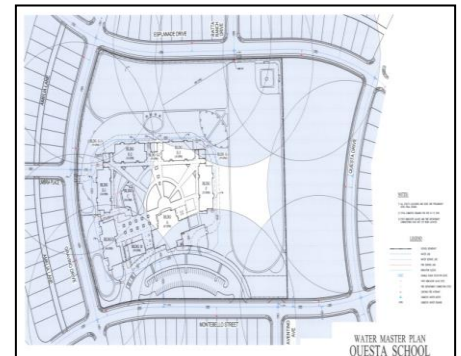
**Knox Systems:** Knox systems are used to secure keys for buildings or protect fire protection system components. All Knox systems are only accessible to fire department personnel.

**Traffic Calming Devices:** Traffic calming devices include the following: speed bumps, humps, dots, round-a-bouts, bollards, etc. and are not permitted on any fire access road unless specifically approved.

### **A. PLAN SUBMITTAL REQUIREMENTS**

1. Construction documents must be submitted directly to the fire department addressing the following elements:

- |                                   |                                     |
|-----------------------------------|-------------------------------------|
| a. Fire Apparatus Access Roadways | f. Fire Hydrants (public & private) |
| b. Fire Lane Identification       | g. Fire Department Connection(s)    |
| c. Gates, Barriers, and Bollards  | h. Post Indicator Valve (PIV)       |
| d. Access Walkways/Ladder Pads    | i. Other Fire Protection Equipment  |
| e. Addresses                      | j. Knox Systems                     |



## B. ROADWAY INSTALLATION TIMING

1. When fire apparatus access roads are required to be installed, such improvements shall be installed and made serviceable before the start of vertical construction, except when alternative timeframes are approved.

## C. ACCESS ROADWAY REQUIREMENTS

1. Fire apparatus access roadways shall be provided for every facility, building, or portion of a building so that all parts of an exterior wall of the first story of the building are located more than 150 feet from a fire apparatus access as measured by an approved route around the exterior of the building.
2. The dimension of 150 feet in relation to fire department access for smaller buildings is commonly referred to as hose pull distance. Hose pull is measured along a path that simulates the route a firefighter may take to access all portions of the exterior of a structure from the nearest fire access road. All obstructions such as fences, planters, vegetation, topography, and other structures must be considered when determining whether the building is accessible from a particular location on the fire access roadway (**see Figure 1 and 5 of this standard for details**).

**Note:** We do not increase the hose pull distance for buildings equipped with fire sprinklers.

### 3. Multiple Access Points:

- a. **Commercial & Industrial Developments:** Buildings or facilities having a gross building area of more than 62,000 square feet shall be provided with two separate and approved fire apparatus access roads.
- b. **Multi-Family Residential Developments:** Multiple-family residential projects having more than 100 dwelling units shall be provided with two separate and approved fire access apparatus roads
- c. **Remoteness:** Where the code requires two access roads, they must be placed a distance apart equal to not less than one-half the length of the maximum overall diagonal dimension of the property or area to be served, measured in a straight line between accesses.

### 4. Aerial Access

- a. The vertical distance between the grade plane and the highest roof surface exceeds 30 feet, approved aerial fire apparatus access roads must be provided.
- b. Aerial apparatus access roadways must be located so aerial apparatus will have clear access to the “entire” face/sides of the building as required. The minimum number of sides is project-specific but generally includes a minimum of two and up to four sides depending on the building configuration, building design, occupancy, and construction type (**see Figure 5 of this standard for details**).
- c. Aerial access roadways must be located not less than 15 feet and not greater than 30 feet from the building and shall be positioned parallel to the entire face/side of the building.

### 5. Width

- a. The minimum width of a fire access roadway is 26 feet.

**Exception:** Building(s) that do not exceed 30 feet in height from the grade plane or do not have fire hydrants may be a minimum of 20 feet in width when approved.

### 6. Parking

- a. No parking is permitted on streets narrower than 32 feet in width. Parking on one side is allowed on a private roadway at least 26 feet but less than 38 feet in width. Parking on two sides is permitted on a private road 38 feet or more in width (**see Figures 2 & 3 of this standard for details**).

### 7. Vertical Clearance

- a. Fire access roads shall have an unobstructed vertical clearance of not less than 13 feet 6 inches. Aerial apparatus access roads may require additional vertical clearance (**see Figure 4 of this standard for details**).

## 8. Obstructions and Firefighter Safety

- a. Overhead utility and power lines easements shall not be located over the aerial fire apparatus access road or between the aerial fire apparatus road and the building or structure to avoid the possibility of injury and equipment damage from electrical hazards (see **Figures 6 of this standard for additional information**).
- b. Trees at full development must not exceed 30' in height and not impair an aerials apparatus to sweep the sides of a building.
- c. Other obstructions such as site lighting, bio-retention, and architectural features are reviewed case-by-case.
- d. Projections such as light poles, signposts, mailboxes, planter walls, and vegetation shall not be placed near the edge of the fire lanes where they can obstruct or be struck by portions of an emergency vehicle.

## 9. Surface

- a. A paved surface was designed and maintained to support the imposed load of fire apparatus with a gross vehicle weight of 75,000 pounds.

## 10. Grade

- a. The grade for access roads shall not exceed 10 percent to facilitate fire ground operations

## 11. Approach & Departure Angles

- a. The approach angle shall not exceed 12.0 degrees, angle of departure 10.0 degrees, and break over angle 5.82 degrees unless approved (see **Figure 7 of this standard for additional information**).

## 12. Turning Radii

- a. The minimum inside turning radius for fire access roads shall be 36 feet or greater.

## 13. Dead-End Access Roadways

- a. Dead-end fire access roads more than 150 feet in length (measured from the curb perpendicular to the roadway) shall be provided with an **approved** turning around. Turnarounds are **approved** on a project-by-project basis depending on various factors, including but not limited to fire department access, engineered fire protection, and project design.

**Note:** The Fire Department determines acceptable configuration(s) not the project design team, and not all the configurations noted in Appendix D are viable options.

- b. Highlighting that the fire apparatus stops at an imaginary line is not acceptable.
- c. Turnarounds below a building are not acceptable.

## 14. Bridges & Culvert

- a. Where a bridge or culvert crossing is part of a fire apparatus access road, the bridge shall be constructed and maintained in accordance with AASHTO HB 17. Bridge and culvert crossings that serve as part of fire apparatus access roads shall be designed for a live load of a minimum of 75,000 pounds gross vehicle weight. When required, vehicle load limits shall be posted on both entrances to the bridge and/or culvert crossing.

## 15. Traffic Calming Devices

- a. Traffic calming devices including, gates, bollards, speed bumps, speed humps, speed dots, round-a-bouts, etc., are not permitted on any designated fire access roadway unless approved.

## D. PREMISE IDENTIFICATION

- 1. See the City of Santa Clara, Community Development Department, Building Division and Fire Department, Premises Identification standards for specific requirements.

## **E. FIRE LANE IDENTIFICATION**

1. Fire apparatus access roads shall be marked with permanent signage “NO PARKING-FIRE LANE – CVC 22500.1”. In only specific circumstances, signage with “NO STOPPING-FIRE LANE – CVC 22500.1” may be used upon approval. Signs shall have a minimum dimension of 12 inches wide by 18 inches high and have red letters on a white reflective background. The word “NO” shall be presented in a reverse color arrangement in the upper left-hand corner. Signs shall be posted on one or both sides of the fire apparatus road as required (**see Figure 8 of this standard for details**).
2. All designated fire lanes with raised curbs shall be painted red. “NO PARKING – FIRE LANE” or “NO STOPPING – FIRE LANE” shall be in white paint, 6 inches in height with a minimum 1-inch stroke, except curb heights less than 6 inches may have reduced letter sizes for the vertical signage on the curb but shall not be less than 4 inches. Lettering shall be painted at an interval of every 25 feet (**see Figure 8 of this standard for additional information**).
3. Property owners shall not designate and/or identify any roadway on their property as a fire lane without prior approval. The property owner must install and maintain all signs and curb markings.

**Exception:** Alternative fire lane signage plans are considered on a case-by-case basis.

## **F. PERIMETER ACCESS**

1. When fire apparatus access roadways are not provided around the entire perimeter of a building or structure, all-weather pathways for firefighters are required and meet the following requirements:
  - a. Pathway width must be a minimum of 60-inches;
  - b. All-weather pathways must be concrete, asphalt, pavers, or another approved engineered surface.

## **G. EMERGENCY ESCAPE AND RESCUE WINDOWS ACCESS**

1. Emergency escape and rescue window access have a dedicated standard addressing the specific requirements, which can be found on our website.

## **H. ACCESS TO FIRE HYDRANTS AND FIRE DEPARTMENT CONNECTIONS**

1. According to California Vehicle Code, fire hydrants located on a public or private roadway shall have an unobstructed clearance of not less than 30 feet (15 feet on either side of the fire hydrant). Fire lane signage must comply with the California Vehicle Code and be installed per this standard.
2. The developer must work with Public Works to arrange the installation of the blue dots on public roadways. The developer is always responsible to install the dots in an approved manner. (**see Figure 13 of this standard for additional information**).
3. Fire department connections (FDC's) shall be painted red on for a total of 15 feet (7.5 feet on either side of the FDC).

## **I. GATES AND BOLLARDS**

1. Permits are required for all new access gates, bollards, or barriers that may impede emergency vehicle or personnel access to a structure or facility. All-electric automatic opening gates shall be equipped secondary power source to function during power loss.
  - a. **Gates**
    - 1) Openings for access gates located across fire apparatus access roads shall be a minimum of 20 feet of clear width. They shall also be provided with a minimum unobstructed vertical clearance of 13-feet, 6 inches (**see Figure 12 of this standard for additional information**). Project conditions may require extra width and vertical clearance.

## 2) Automatic Gates

- i. All gates installed on designated fire department access roads must be electrically automatic powered gates. Gates shall be provided with an emergency battery power supply or shall be a fail-safe design, allowing the gate to be pushed open without the use of special knowledge or equipment.
- ii. A detector/strobe switch shall be installed to control the automatic gates to allow emergency vehicles (e.g., fire, police, ems) to flash a vehicle-mounted strobe light towards the detector/strobe switch, which in turn overrides the system and opens the gate. The gates shall be equipped with a TOMAR Strobe Switch or 3M OPTICOM Detector to facilitate this override. Said device shall be mounted at a minimum height of eight to ten feet (8' - 10') above grade and is subject to an acceptance test witnessed by the Fire Department before final approval of the project.
- iii. Said device shall be mounted at a minimum height of seven feet (7') above the adjacent road surface and is subject to an acceptance test witnessed by the Fire Department before final approval of the project.

## 3) Manually Operated Gates – Construction Sites

- i. Manual gates and barriers shall be provided with Knox Padlocks, Model 3770 manufacturer by the Knox Company (**see Knox Systems Installation standard for detailed information**). The Knox padlocks are used to secure manually operated gates or barriers. They can be used in conjunction with the property owner's padlock(s) to allow access for property owners and emergency responders. This access control system requires testing before the project's final approval (**see Knox Systems Installation standard for detailed information**).

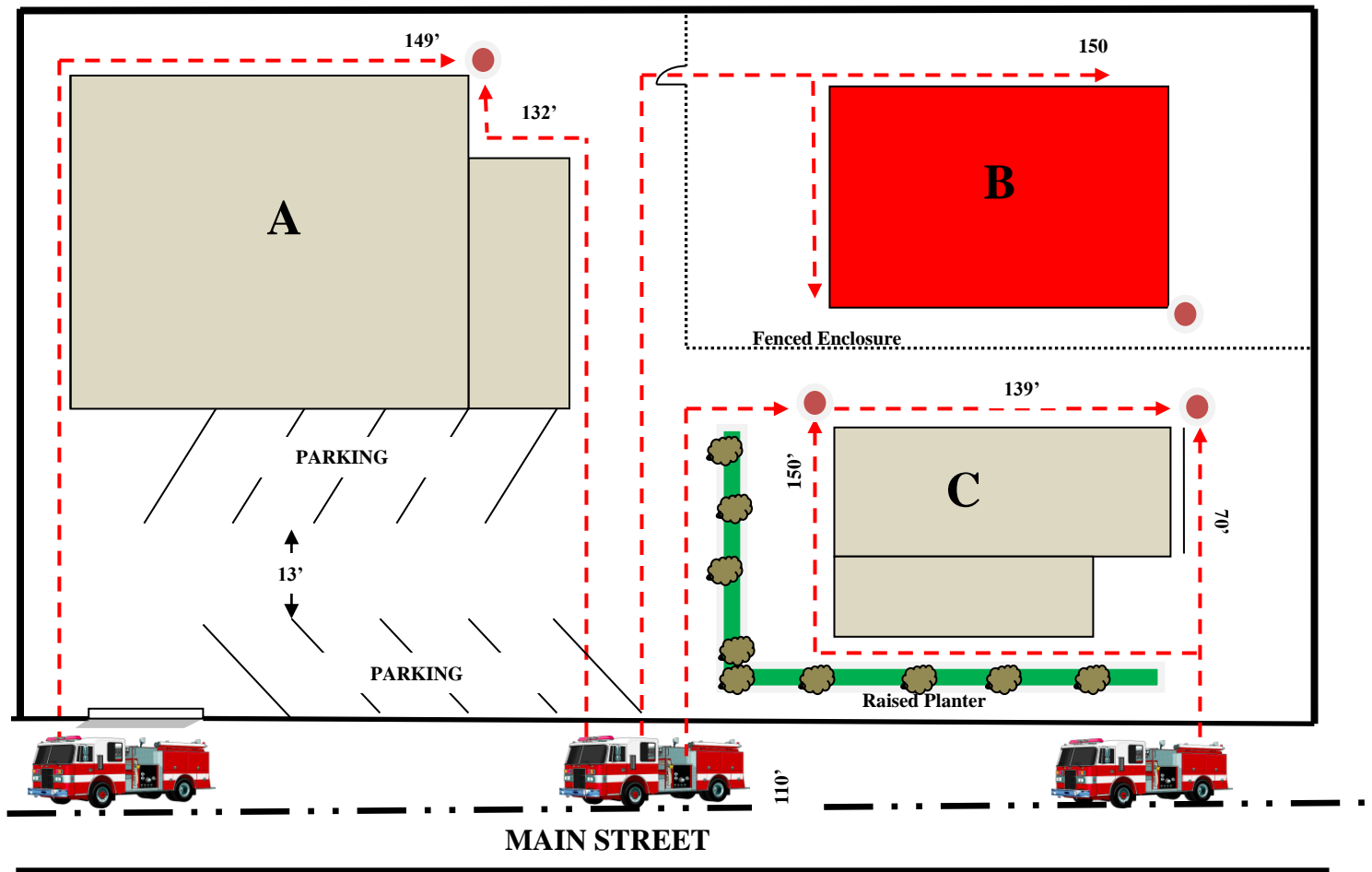
## J. **ACCESS CONTROL BOLLARDS**

1. Bollards on emergency vehicle access roadways shall be steel not less than 6 inches in diameter. Bollards must be spaced not less than 6' - 6" feet on center between post(s). The center bollard or bollards shall be automatic retractable pneumatic type. The bollard(s) shall fail in the retracted position upon loss of power (**see Figure 9 of this standard for additional information**).
2. To control the automatic pneumatic bollard(s), a detector/strobe switch shall be installed to allow emergency vehicles (e.g., fire, police, ems) to flash a vehicle-mounted strobe light towards the detector/strobe switch, which in turn overrides the system and retracts the bollard(s). The bollard(s) shall be equipped with a TOMAR Strobe Switch or 3M OPTICOM Detector to facilitate this override. Said device shall be mounted at a minimum height of eight to ten feet (8' - 10') above grade and is subject to an acceptance test witnessed by the Fire Department before final approval of the project.

## K. **FIRE COMMAND CENTER**

1. The fire department must approve the location, design, and layout of the fire command center.
2. The fire command center must be located on the exterior of the building with direct access to the interior of the building (**see Figure 11 of this standard for additional information**).
3. The fire command center shall be separated from the remainder of the building by not less than a 2-hour fire barrier constructed following the California Building Code.
4. The fire command center shall be not less than 0.015 percent of the total building area or 200 square feet in area, whichever is greater, with a minimum dimension of 0.7 times the square root of the room area or 10 feet whichever is greater.

**FIGURE 1 – Fire Department Perimeter Access**




**Informational Guidance:**

Assume that the parking lot is not accessible to fire apparatus due to the turning radii and roadway widths more diminutive than the required minimums:

1. All portions of building “A” are within 150’ of the public road as measured along the path of firefighter travel.
2. Building “B” is not accessible; the presence of a fenced enclosure forces firefighters to backtrack once they pass through the gate, increasing their travel distance beyond 150’.
  - a. On-site fire apparatus access roadways or a change in the location of the gate would be necessary to provide access to Building “B.”
3. Building “C” is also accessible despite the obstruction posed by the raised planter.

**Legend:**

-  - Denotes the furthest point on the exterior of the building as measured along the path of firefighter travel around the exterior of the building.

**FIGURE 2 – Engine Road Width**



**Note:** Minimum roadway width must be 26 feet when fire hydrants are installed along roadways.

**FIGURE 3 – Aerial Access Road Width**



**Roadway less than 26'**

**\*Parking is prohibited, and the roadway is required to be posted as a fire lane.**



**Roadway at least 26' but less than 32'**

**\*Roadway is required to be posted as a fire lane on at least one side.**



**Roadway 38' or wider**

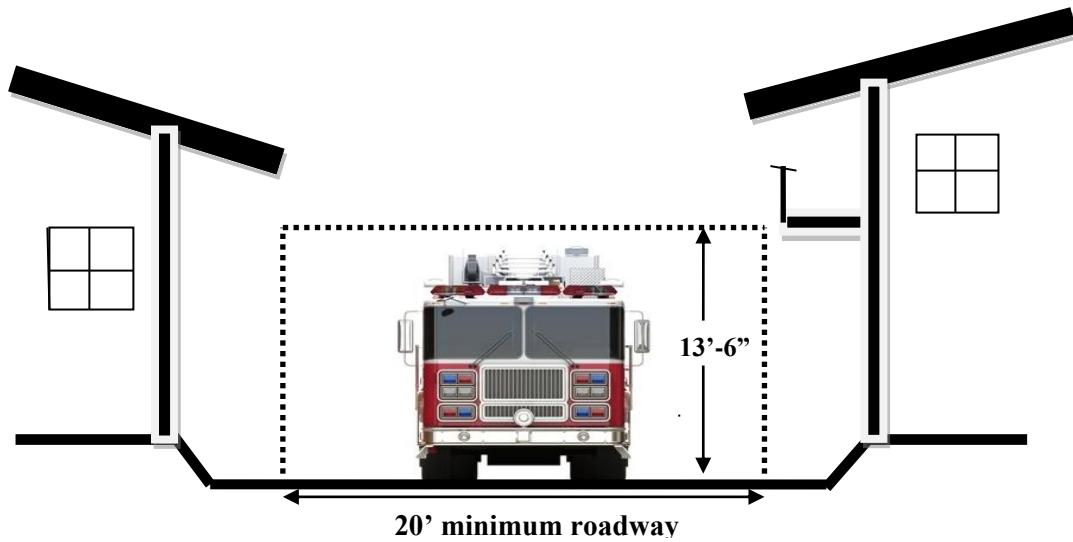
**\*Parking is permitted on both sides of the roadway.**

**Notes:**

1. All dimensions are minimums are from face-of-curb to face-of-curb, exclusive of shoulders or rolled curbs.
2. Aerial apparatus access roads may require additional width as determined by the fire department.



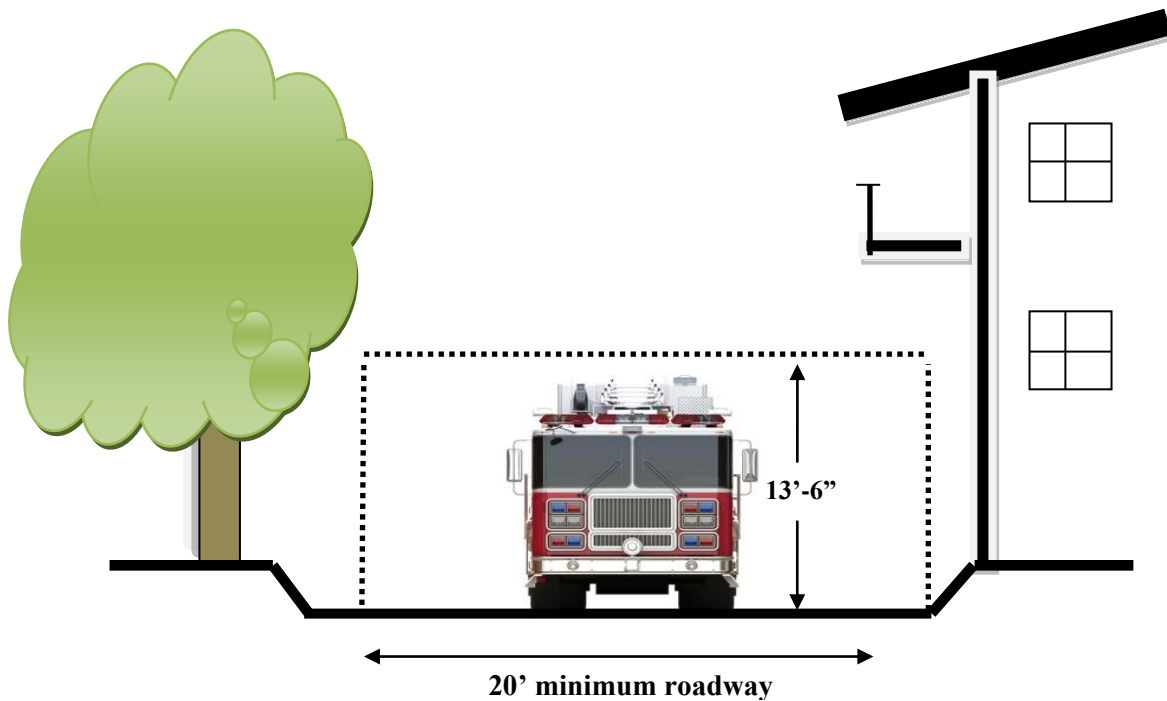
**FIGURE 4 – Vertical Clearance**



**PROPER CLEARANCE PROVIDED**

Eaves, balconies, and other obstructions do not encroach upon the 20' wide by 13'-6" high fire access roadway envelope.

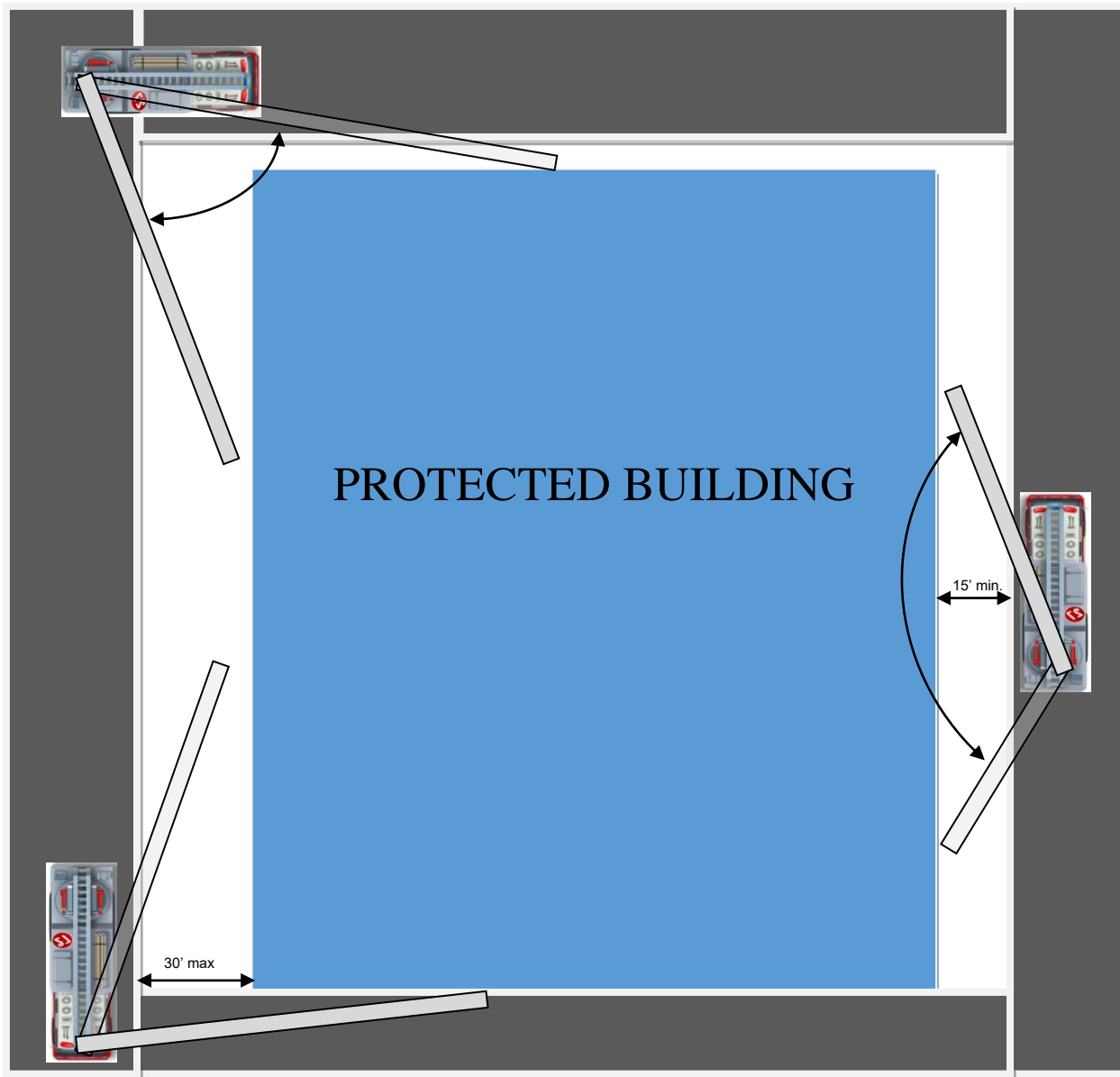
**Note:** Aerial apparatus access roads may require additional vertical clearances as determined by the fire department.



**INSUFFICIENT CLEARANCE**

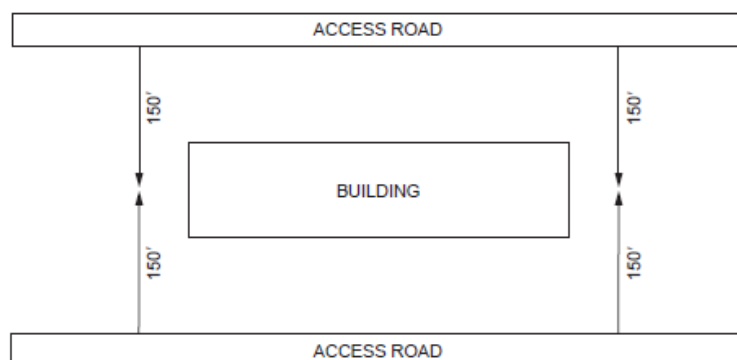
A 20' wide roadway has been provided, but eaves and vegetation effectively reduce the clear dimension below required minimums.

**FIGURE 5 – Aerial Access and Sweep of the Building**



**Notes:**

1. The fire department determines the number and location of aerial access roadways. It is not uncommon for access to all four sides of a medium or large building to require perimeter access roads.
2. Most small buildings require a minimum of two aerial access roadways and are generally the long sides. The purpose is to have the ability to access all four sides of the building readily.



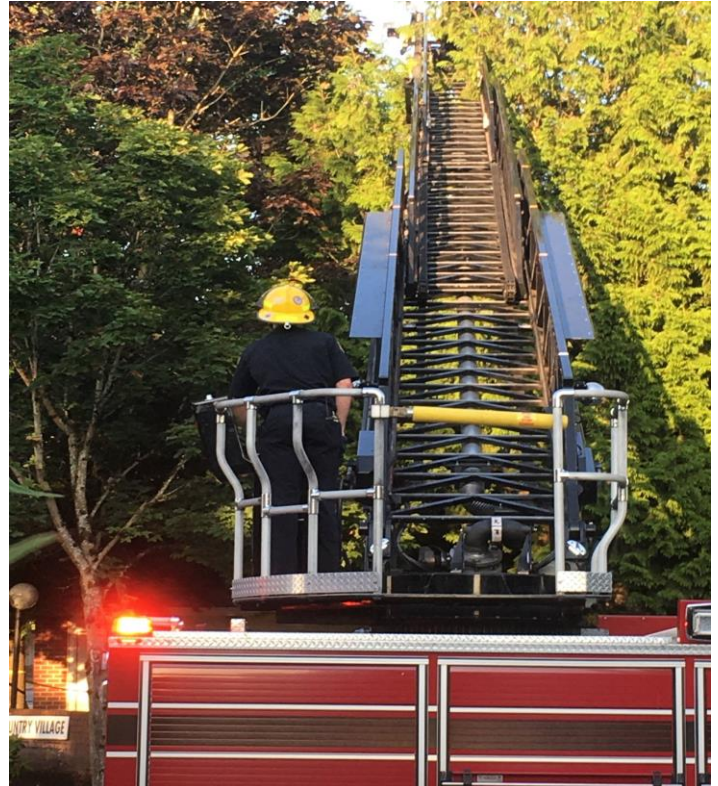
## FIGURE 6 – Trees and Overhead Power Lines

1. Trees between the access roadway and the building are limited to a maximum height of 30 feet at full maturity so that aerial apparatus can access the roof or sweep the side of the building, as reflected in Exhibit 1. Aerial apparatus ladders do not work with large tree canopies, as reflected in Exhibit 2.

**Exhibit #1**



**Exhibit #2**



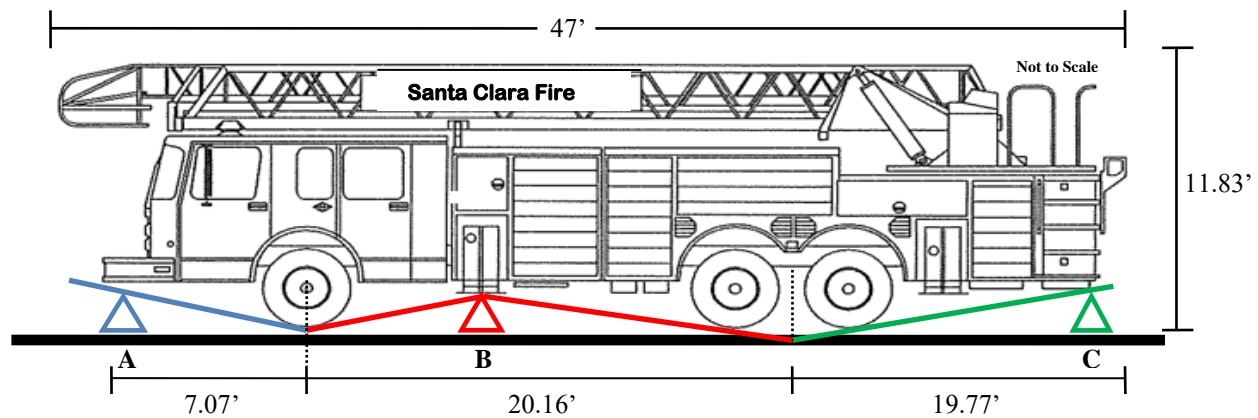
2. Overhead utility and power lines must not be located over the aerial fire apparatus access road or between the aerial fire apparatus road and the building or structure. The photographs below illustrate what can happen when aerial apparatus contact power lines.



## FIGURE 7 – Apparatus Specifications

### APPARATUS SPECIFICATIONS:

1. The apparatus illustration noted below is not to scale and reflects a compilation of the most restrictive elements of our emergency vehicle fleet.
2. When driving at speed is not required and approved by the fire department Autoturn, or similar computer modeling software can be utilized to reduce the size of the standard internal turning radius required.



### APPARATUS SPECIFICATIONS:

- Length: 47.0 feet
- Cab Width: 8-feet
- Overall Width: 9.5 feet (mirror-to-mirror)
- Height Clearance (minimum): 13.6 feet
- Front Bumper to Front Axel: 7.07 feet
- Rear Axle to Rear Bumper 19.77 feet
- Wheelbase: 20.16 feet
- Wall-to-Wall Radius: 47.7 feet
- Inside Cramp Angle: 45-degrees
- Track Wheel: 8.5-feet

## FIGURE 8 – Fire Lane Identification

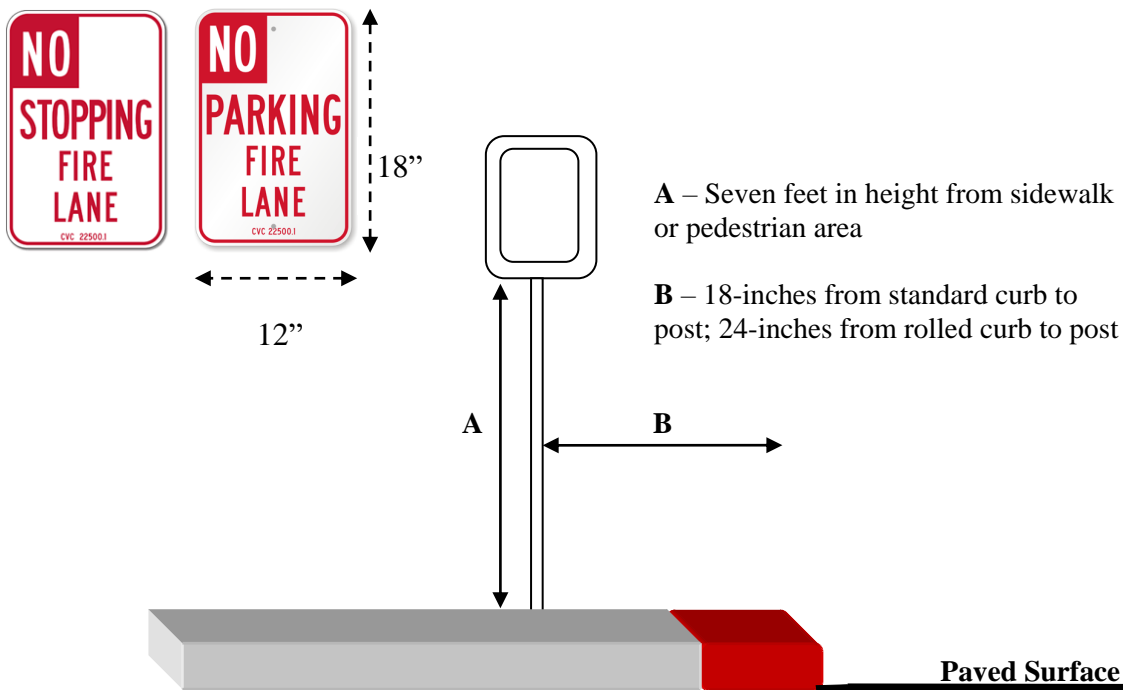
### STANDARD CURB DETAIL:



### ROLLED CURB DETAIL:



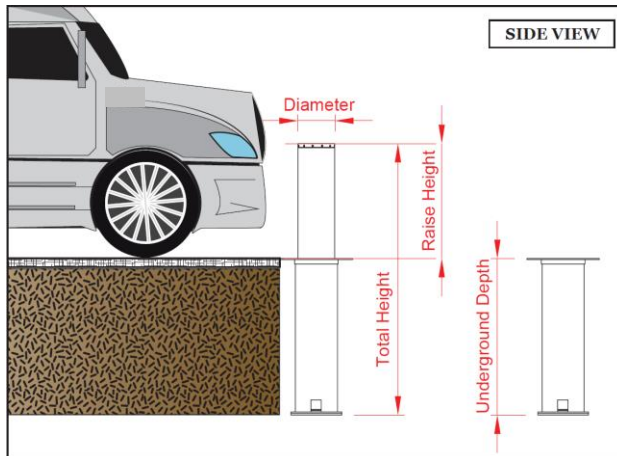
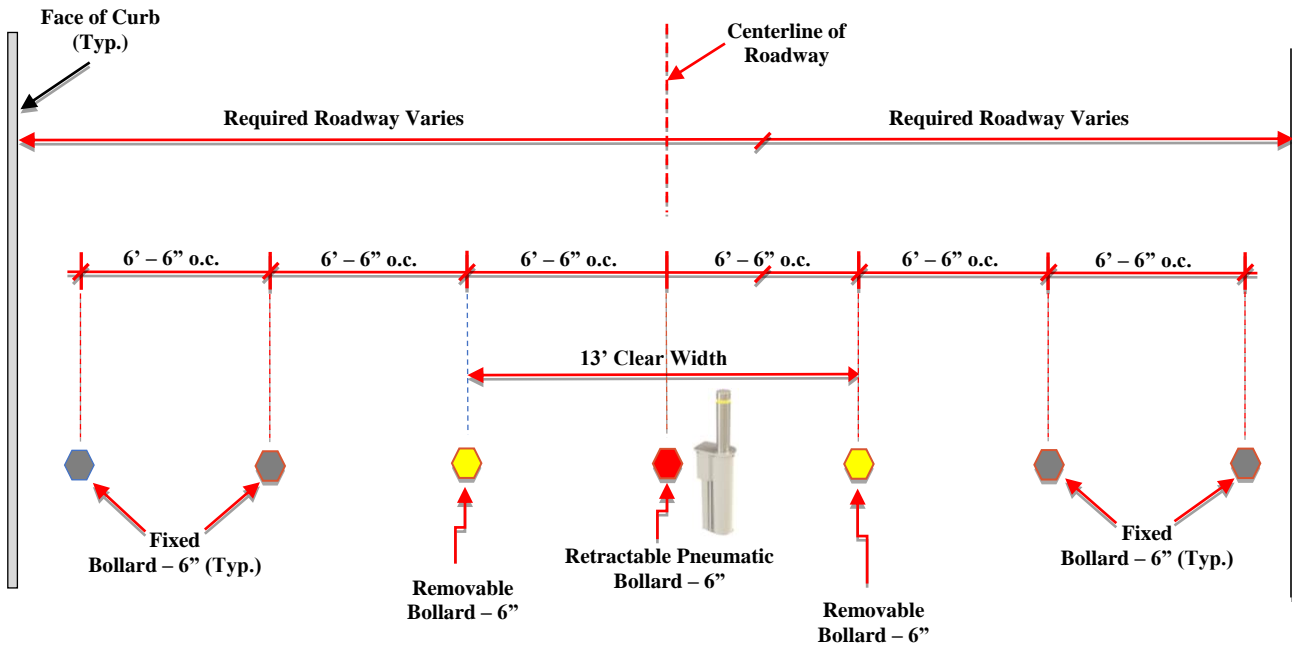
### SIGN INSTALLATION DETAILS:



**Note:** Signs may be mounted on existing posts, fences or buildings, if post, fence, or building is no more than 24-inches from the curb or edge of road surface.



**FIGURE 9 – Retractable Pneumatic Bollards**



**Notes:**

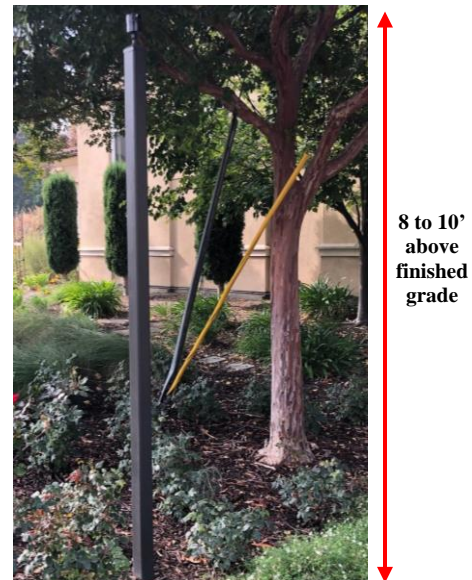
1. Retractable Pneumatic bollard(s) are required to be equipped with Opticom Detector or Tomar Strobe Switches as outlined in Appendix "XXXX".
2. Other installation configurations may be acceptable based on field limitation.

## FIGURE 10 – Opticom & Tomar Emergency Access Control

**Dual Strobe Detector (2-way access)**



**Single Strobe Detector (one-way access)**

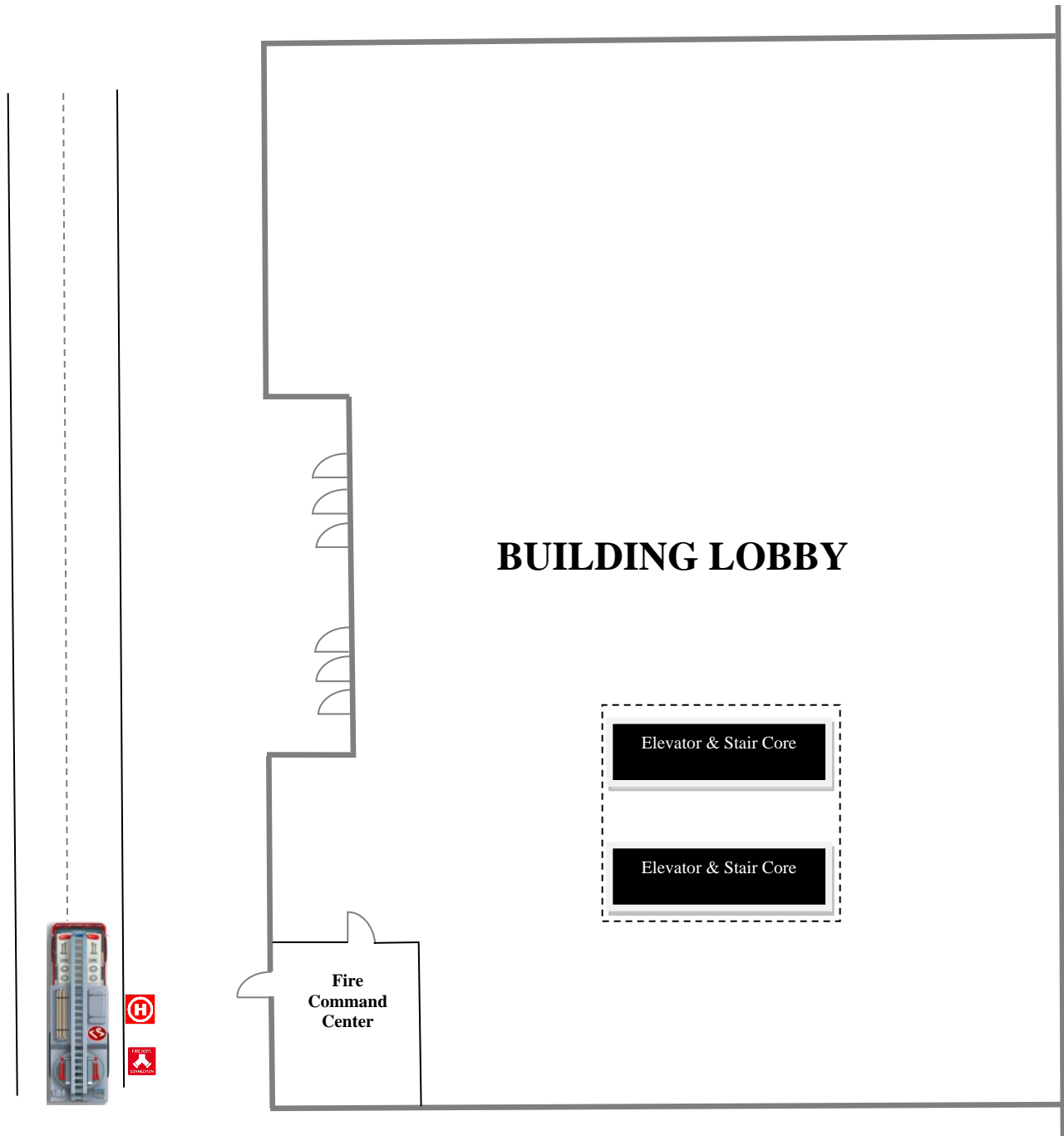


- ✚ Emergency access control systems consist of two components. The first is a detector installed on the control system. The second is an emitter on the emergency vehicle (Fire, Police, or EMS) apparatus. The transmitted from the vehicle-mounted device triggers the detector to open the barrier as the vehicle pulls up to it. This prevents the vehicle from having to stop so someone can use the key switch helping to cut down on our response times to the emergency.
- ✚ The Opticom and Tomar technology all optimum speed and security property owners. Getting on scene faster can mean the difference between life and death, and these sensors aid in getting us to emergencies quickly and safely, so they can do what they do best. Delays in arriving on the scene can put property and lives at risk, and even their own. For example, with every minute it takes to arrive at a cardiac event, a patient's chance of surviving drops 7 to 10 percent, according to the Sudden Cardiac Arrest Foundation. A delay in responding to a fire can cause the fire to reach the flashover point, resulting in more significant losses.
- ✚ The type of sensor needed is always project-specific, so please consult your plan reviewer if you have specific questions.

[Opticom Website Link](#)

[Tomar Website Link](#)

**FIGURE 11 – Fire Command Center**



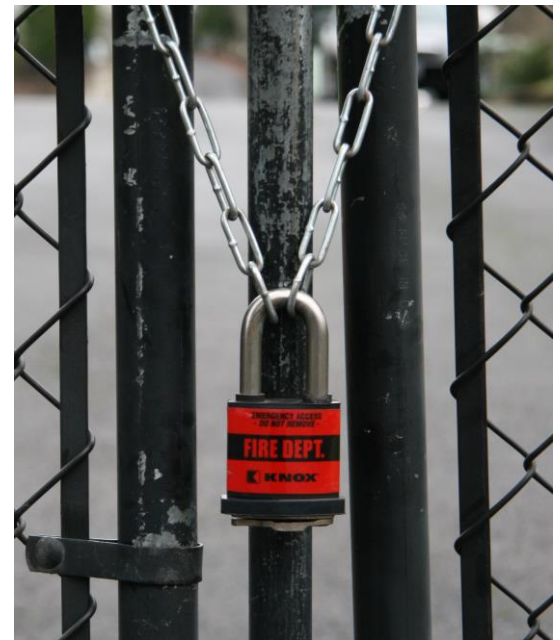
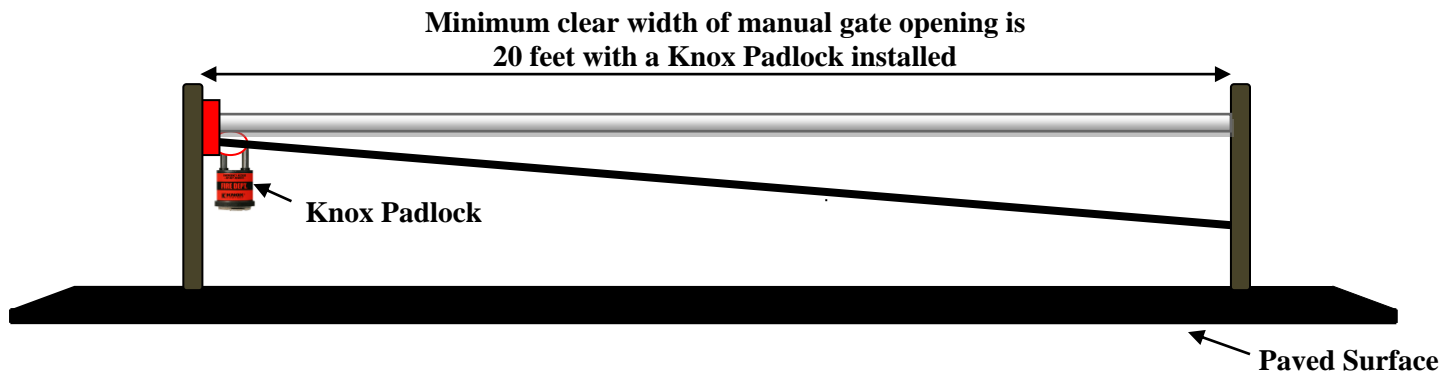
**Notes:**

1. Fire Command Centers are required to be a minimum of 200 square feet and located on the exterior wall of the building (generally on the address side of the building) with an exterior access door.
2. An interior door into the building with access to the ground floor lobby to access the interior of the building.
3. Fire Command Centers are required to be 2-hour construction, and no other equipment than that required for fire suppression operations shall be located within this room (e.g., FACP, Smoke Control System Digital Display, ERRCS, Generator).
4. A fire hydrant and fire department connection (FDC) are required to be in this vicinity. There will always be additional fire hydrants and possible multiple FDCs.



**FIGURE 12 – Manual Gates (Existing/Construction Sites)**

**Manual Gate Construction Site**



**FIGURE 13 – Reflective Hydrant Marker “Blue Dot” Installation**

